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ORIGINAL RESEARCH—EPIDEMIOLOGY

Factors of the HIV Transmission in Men Who Have Sex with Men in Suizhou City from 2009 to 2013

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ABSTRACT

Introduction. The primary transmission of human immunodeficiency virus (HIV) has been recently changing worldwide. In China, HIV transmission through heterosexual contact remains the predominant mode, but the prevalence of men who have sex with men (MSM) has been increasing.

Aim. This article investigated the overall epidemic trend and associated high-risk behavior among MSM in Suizhou City and explored the government's responses to the epidemic.

Methods. We conducted yearly cross-sectional behavioral surveillance surveys among MSM in Suizhou City from 2009 to 2013. Participation was anonymous and self-completed. Recruitment methods were consistently applied in each survey.

Main Outcome Measures. Semi-structured questionnaire surveys and yearly work summaries were conducted.

Results. Most of the MSM groups in Suizhou City were young adults ($P < 0.05$), well educated ($P < 0.05$), and married ($P < 0.05$). Two years after our interventions, we found an increasing trend of condom use during anal sex ($P < 0.05$), as well as commercial sex trade ($P < 0.05$).

Conclusions. HIV continues to spread rapidly among MSM in Suizhou City. The high-risk behavior among MSM remains a hindrance to HIV prevention. Innovative intervention approaches are essential for HIV surveillance and prevention among MSM in Suizhou City. **Yang F, Shi X, He W, Wu S, Wang J, Zhao K, Yuan H, Martin K, and Zhang H. Factors of the HIV transmission in men who have sex with men in Suizhou City from 2009 to 2013. Sex Med 2015;3:24–31.**

Key Words. HIV; MSM; Intervention; High-risk behavior; Anal Intercourse with Male; Condom Usage

Introduction

AIDS is a serious public health issue that inevitably delays the development of the global economy, including China [1]. New changes occur along with many challenges as the human immunodeficiency virus (HIV) epidemic continues [2]. According to the 2012 UNAIDS report on the global AIDS epidemic, 34.0 million people were infected with HIV, 2.5 million people had newly acquired HIV infections, and 1.7 million people died from AIDS-related causes by the end of 2011 [3]. The characteristics of HIV epidemic vary in different countries and different regions in the

same country [4]. The primary transmission of HIV in developed countries is through homosexual contact [5–7]. In African countries, it is acquired through heterosexual contact and mother to child [8–10]. In China, HIV transmits predominantly through heterosexual contact, but wide geographic variations of HIV epidemic exist [11]. From 2000 to 2010, HIV prevalence among men who have sex with men (MSM) increases worldwide [12–14]. Baral et al. reported that HIV was more likely to infect MSM than other men of reproductive age in seven Asian countries [12,15]. MSM are particularly vulnerable to HIV because of multiple sexual partners, bisexual behavior, unprotected sex, and lack of awareness on HIV [15–16]. In developing countries, particularly low- and middle-income countries, high-risk HIV among MSM is associated with various sexual partners and unprotected sex [13,15,17].

The China Centers for Disease Control (CDC) has recognized the importance of HIV prevention for MSM and provided targeted interventions for high-risk MSM, defined as MSM with multiple sexual partners. The prevention package includes peer-led outreach education, promotion, distribution of condoms and lubricant, sexually transmitted infection clinical services, community mobilization, and structural intervention [18]. HIV voluntary counseling and testing services are also provided on-site or through referrals.

Suizhou City is located in the northwest of Hubei Province and adjacent to the Tongbai County of Henan Province. Suizhou City has jurisdiction over one district (Zengdu District), one county (Sui County), and one county-level city (Guangshui City) [19]. One of the three locations surveyed, this city is first to have integrated control of the HIV/AIDS demonstration zone in the country, which is supported by the Global Fund AIDS project counties in China. The first case of AIDS in Suizhou City was reported in April 2001 [20]. By the end of September 2008, a total of 582 individuals with HIV/AIDS were reported. HIV transmission was mainly attributed to paid blood donors in the mid-1990s. These individuals live in 17 towns of Zengdu District and 6 townships of Guangshui. Given the increase in population flow and migrant workers, prostitution, MSM, and other populations are considered as the principal sources of HIV transmission in Suizhou City. Sexual contact remains route of AIDS transmission. In addition, many prior studies on MSM behavior and HIV prevalence had been studied. Thus, it remains unclear which infectors of MSM high-risk behavior states facilitate HIV prevalence.

Since 2009, a wide range of HIV interventions among MSM have been introduced through the MSM social organization in Suizhou City and have achieved certain results. However, the MSM who received interventions from our AIDS workers or society organizations' peer educators were infected with AIDS. To elucidate the underlying reason for the increase in HIV incidence in MSM and improve the city's prevention measures, we had one-on-one in-depth interviews with HIV-positive MSM who received AIDS interventions.

Aims

This study presents the socio-demographic characteristics and HIV prevalence of MSM. The authors investigated the factors associated with HIV infection among MSM and highlighted the need of specific services for this population. We investigated the overall epidemic trend and associated high-risk behavior among MSM in Suizhou City. The government's responses to the epidemic were also explored.

Method

Participants and Procedure

Data for this study were obtained through cross-sectional surveys of MSM in Suizhou City conducted from March 2009 to June 2013. All respondents were Chinese male who live in Suizhou City. Eligibility for the study includes (i) over 18 years old; (ii) self-identifying as an MSM or at least has one male sex partner; (iii) receiving primary HIV care at the Suizhou CDC; and (iv) receiving at least one AIDS intervention worker or social organization MSM peer education intervention.

Sampling and Recruitment

Snowball sampling method was used in selecting the respondents for the surveys. The method was chosen to respect the participants' privacy. This was also in consideration of the major stakeholders of MSM community in Suizhou City. Given the city size and limited resources, snowball sampling provided the optimal accrual method. The seeds for the study represented a diverse set of individuals in terms of age, annual income, and education

levels. These individuals had great influence on the MSM community and were motivated to participate efficiently.

Procedure

Participation was anonymous and self-completed. The participants were recruited from local bars, reflexology sites (A reflexology parlor is a place where Eastern medicine is applied through foot and other kinds of massages. Reflexology parlor includes massage parlors, bathhouses, pedicure salons, and sauna rooms.), and parks. Once informed consent was obtained, face-to-face interviews were conducted. These interviews were carried out by experienced and well-trained interviewers who were staff members of the Suizhou AIDS Prevention and Control Centers for Disease Control and Prevention Officers (PCCDCPO). The questionnaire was designed by Suizhou AIDS PCCDCPO and consolidated views from MSM community organization members. We carried out pre-interviews and repeatedly revised the questionnaire in accordance with the pre-interview's initial evaluation. The age, education, and HIV disease characteristics (CD4 cell count, viral load, etc.) of the participants were measured. Respondents who reported insertive or receptive anal intercourse with a given partner type (casual, current regular) were requested to indicate the frequency of condom use using a three-point scale (every time, sometimes, never) 6 months prior to interview. The work summaries were conducted by investigators every year. These annual work summaries included participants' recruitment sites and other kinds of information except questionnaire.

Main Outcome Measures

Potential factors were distributed into four blocks: (i) background variables, including age, education, and annual income; (ii) sexual behavior in the last 6 months and condom use rate; (iii) HIV test; and (iv) the knowledge of HIV transmission.

HIV Testing Procedure

All participants were asked questions to determine if they had previously tested positive for HIV. Blood samples were obtained from participants who approved the test. After the interview, we detected serum HIV antibodies using enzyme-linked immunosorbent assay. Finally, we sent the positive blood samples to the Hubei Provincial Center for Disease Prevention and Control to confirm the test results by western blotting.

Statistical Analysis

We conducted a χ^2 test for heterogeneity and trend across the five surveys to analyze respondent characteristics, sexual partnering, and behavior variables. For the four main indicators (HIV test, condom use rate in the last 6 months, condom use rate of commercial sex, condom use of heterosexual sex), we conducted χ^2 test from 2009 to 2013. Moreover, the crude odds ratio (OR) and 95% confidence interval (CI) were determined to examine the changes between each two consecutive years for four main indicators and changes between surveys in 2009 and 2013.

Ethical Review

The study protocol was approved by the institutional review boards of the Tongji Medical College, Huazhong University of Science and Technology. All the participants signed the written informed consent after the investigator personnel explained the study protocol to them.

Results

Sample Characteristics

Participants who did not finish the survey (The response rate in 2008 is 92.4%, indicating that 19 participants did not finish the survey, 99.5% in 2009 or 1 participant, and 96.3% in 2010 or 10 participants. In 2011 and 2012, all participants finished the survey.) were excluded from the study. We collected 1,500 responses from MSM across five survey rounds. Most of the participants were recruited from the reflexology sites. Almost 60% of the participants were under 30 years old, and more than 67% were married (the marriage is between man and woman) (Table 1). Disaggregating the samples by recruitment site revealed diverging trend in age profiles. The participants recruited in bars were young.

Behavior Analysis Results

A total of 199 (86.15%) participants confirmed that they had anal sex with a male in the last 6 months in 2009, 153 (73.2%) in 2010, 255 (98.1%) in 2011, and 400 (100%) in both 2012 and 2013. Approximately 71.43% of the participants used condom during anal sex with a male in the last 6 months in 2009, 47.1% in 2010, 36.2% in 2011, 71.28% in 2012, and 84.25% in 2013. Trends in high condom use were consistent ($P = 0.018$) for MSM during anal intercourse with a male (Table 2). For the four main indicators, crude ORs with 95% CIs examined changes between each

Table 1 Demographic characteristics of the sample (percentage)

	2009 n = 231	2010 n = 209	2011 n = 260	2012 n = 400	2013 n = 400	$\chi 2$	*P*	Trend 2009–2013
Recruitment site						15.76	0.046*	0.001*
Bar	11.1	15.3	20.1	18.5	19.2			
Reflexology site	63.6	58.4	59.2	63.5	61.9			
Park	25.3	26.3	20.7	18	18.9			
Age group						17.34	0.027*	0.094
<30	57.1	53.9	52.9	59.8	49.1			
30–44	35.2	32.4	38.2	30.1	37.0			
≥45	7.7	13.7	8.9	10.1	13.9			
Education								
Illiteracy	0	0	0.8	1	0	28.13	0.03*	0.43
Primary school	0.4	3.2	0.8	2.2	1.7			
Middle school	5.9	5.2	9.2	8.3	7.4			
High school	51.4	38.5	47.3	46.2	44.2			
Some college	42.3	53.1	41.9	42.3	46.7			
Marital status						19.04	0.015*	0.677
Unmarried	39	29.1	29.5	35.6	37.6			
Married	58.1	65.2	67.1	57.9	54.9			
Divorced	2.9	5.7	3.4	6.5	7.5			
HIV test						1.793	0.774	0.273
Positive rate	1.05	0.97	1.56	2.30	1.00			

*$P < 0.05$, Statistically significant
HIV = human immunodeficiency virus

two consecutive successive surveys from 2009 to 2013 and changes between surveys in 2009 and 2013. The crude OR indicated that the changes of rate between each two consecutive years had no statistical significance; however, we found that compared with 2009, the rate of "never" use condom in the last 6 months and the rate of "never" use condom for heterosexual sex in the last 6 months decreased significantly, although the rate of "every time" use of condom for heterosexual sex in the last 6 months increased significantly (Table 3). Overall, considering the four main indicators of our interventions, statistical significance was found at the end (2013) compared with the start (2009) of this study.

HIV Testing Results

In 2009, 38 participants refused to give blood samples for the HIV test. Two of the participants whose blood samples taken were positive for HIV. In 2010, we successfully obtained 209 blood samples from the participants, 2 were positive for

Table 2 Behavior and condom use rate of MSM in Suizhou City in the last 6 months (percentage)

	2009 n = 231	2010 n = 209	2011 n = 260	2012 n = 400	2013 n = 400	$\chi 2$	*P*	Trend 2009–2013
Condom use rate in the last 6 months						25.4	0.001*	0.018*
Never	4.8	2.4	0.8	0.8	0.5			
Sometimes	41.5	38.8	40.4	38.5	40.3			
Every time	53.7	58.8	58.8	60.7	59.2			
Commercial sex in last 6 months						14.53	0.006*	0.002*
Yes	10.3	10.0	5.0	4.5	4.0			
No	89.7	90.0	95.0	95.5	96.0			
Condom use rate of commercial sex						1.668	0.990	0.741
Never	12.5	10.0	15.4	11.1	6.3			
Sometimes	54.2	60.0	61.5	66.7	68.7			
Every time	33.3	30.0	23.1	22.2	25.0			
Heterosexual sex in the last 6 months						5.131	0.274	0.625
Yes	71.0	75.6	67.3	73.3	69.8			
No	29.0	24.4	32.7	26.7	30.2			
Condom use of heterosexual sex						15.89	0.044*	0.001*
Never	24.4	18.4	14.3	15.7	11.8			
Sometimes	62.8	65.8	69.1	65.9	67.1			
Every time	12.8	15.8	16.6	18.4	21.1			

*$P < 0.05$, Statistically significant
MSM = men who have sex with men

Table 3 Main indicators by survey round (percentage, OR, 95% CI vs. previous survey round)

	2009 (n = 231)	2010 (n = 209)	2011 (n = 260)	2012 (n = 400)	2013 (n = 400)	2013 vs. 2009
Condom use rate in last 6 months						
Sometime and every time	95.2	97.6	99.2	99.2	99.5	
Never	4.8	2.4	0.8	0.8	0.5	
		0.5 (0.2–1.4)[1]	0.3 (0.1–1.6)[2]	1.0 (0.2–6.2)[3]	1.0 (0.2–5.9)[4]	**0.1 (0.02–0.5)**[5#]
Never and sometime	46.3	41.2	41.2	39.3	40.8	
Every time	53.7	58.8	58.8	60.7	59.2	
		1.2 (0.8–1.8)	1.0 (0.7–1.4)	1.1 (0.8–1.5)	0.9 (0.7–1.5)	1.3 (0.9–1.7)
Condom use rate of commercial sex in last 6 months						
Sometime and every time	87.5	90.0	84.6	88.9	93.7	
Never	12.5	10.0	15.4	11.1	6.3	
		0.7 (0.1–8.5)	1.6 (0.1–21.1)	0.7 (0.1–5.6)	0.5 (0.04–6.1)	0.5 (0.04–4.9)
Never and sometime	66.7	70.0	76.9	77.8	75.0	
Every time	33.3	30.0	23.1	22.2	25.0	
		0.9 (0.2–4.2)	0.7 (0.1–4.5)	1.0 (0.2–5.2)	1.2 (0.2–5.7)	0.7 (0.2–2.7)
Condom use of heterosexual sex in last 6 months						
Sometime and every time	75.6	81.6	85.7	84.3	88.2	
Never	24.4	18.4	14.3	15.7	11.8	
		0.7 (0.4–1.2)	0.7 (0.4–1.3)	1.1 (0.7–1.9)	0.7 (0.4–1.2)	**0.4 (0.3–0.7)**[#]
Never and sometime	81.2	84.2	83.4	81.6	78.9	
Every time	12.8	15.8	16.6	18.4	21.1	
		1.3 (0.7–2.4)	1.1 (0.6–1.9)	1.1 (0.7–1.9)	1.2 (0.8–1.8)	**1.8 (1.1–3.1)***
Positive of HIV test	1.13	0.96	1.54	2.25	1.0	
		0.7 (0.1–4.4)	1.6 (0.3–8.9)	1.5 (0.5–4.8)	0.4 (0.1–1.4)	0.8 (0.2–3.5)

[1]Odd ratio result from comparison between 2009 and 2010
[2]Odd ratio result from comparison between 2010 and 2011
[3]Odd ratio result from comparison between 2011 and 2012
[4]Odd ratio result from comparison between 2012 and 2013
[5]Odd ratio result from comparison between 2009 and 2013
[#]OR < 1& 95%CI exclude 1, indicate decline of the rate is statistically significant
*OR > 1& 95% CI exclude 1, indicate rise of the rate is statistically significant

HIV. In 2011, we collected blood samples from all participants, and only one tested positive for HIV. In 2012, we found 9 HIV-positive from the 400 recruited participants (4 of these participants previously lived with an HIV-positive partner). We found 4 HIV-positive from the 400 participants in 2013.

Discussion

In China, Suizhou is a small city of Hubei Province with a population of 2,577,700 [19]. This city has a high prevalence of HIV. HIV epidemic was initiated and mainly transmitted by paid blood donor in the 20th century. In recent years, sexual transmission, especially male-to-male homosexual transmission, has become the major route of HIV transmission in Suizhou City [21,22].

Some studies show that approximately 85% MSM have had anal sex with men in the past 6 months [22,23]. Similar results were found in the present study. The correct and consistent use of condoms can prevent HIV transmission by 85% to 90% [24–27]. As the population of MSM who had anal intercourse with male increased in the past 6 months, the rate of condom use decreased from 47.1% in 2010 to 36.2% in 2011, then significantly increased up to 84.25% in 2013 after HIV interventions were provided (Figure 1).

Most of the members of the MSM group were young adults and well educated (Table 1). Therefore, increasing the awareness about HIV and AIDS in this group of population is important in promoting the use of condoms.

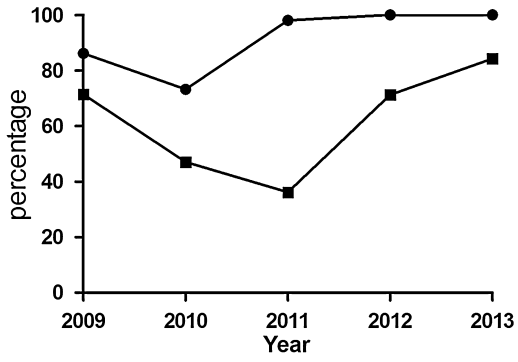

Figure 1 Trend of protected and unprotected anal intercourse of MSM during the last 6 months from 2009–2013. –●– The anal intercourse with male rate in the last 6 months (2009–2013). –■– The rate of use of condom during anal intercourse with male in the last 6 months (2009–2013).

Early information dissemination and education increased knowledge about AIDS, but the rate of condom use during anal sex remained low. Acute gap separation existed between knowledge and behavior.

Condom use varies across types of sexual partners among Chinese MSM [22]. Some studies reported that 25 to 35% of MSM are currently married to a female [22,28] and more than 70% of MSM will potentially get married to a female [22,29]. Almost 63.2% of the MSM in our study were married, and almost 72.3% of MSM had sex with a female in the last 6 months. The condom use during heterosexual sex was unexpectedly increasing yearly. According to Folch et al.'s research, and our survey, social and family pressure were the reason MSM married a female [30].

Some studies suggested that a substantial proportion of Chinese MSM is also involved in the male-to-male commercial sex trade [31]. The present study also confirmed the presence of sex trade, but this trend declined ($P < 0.05$). Only one-third of MSM who were engaged in paid sex activity used condom during anal sex in the past 6 months. Moreover, the interventions we provided in the current study did not affect well during this period. Reviews demonstrated that the odds of exposure to HIV among men who had paid for sex are 1.3 (95%) times higher than the general MSM population [22,32].

Despite the availability of a free HIV test, some respondents refused to participate (most of them fear that the identities of MSM might be exposed). Our staff explained the necessity of the HIV test to the participants during the study. The rate of blood sample collection from MSM participants increased from 83.5% in 2009 to 100% in 2013. We also provided a discussion about intervention on HIV/AIDS each year during the survey. However, newly HIV-infected cases were still reported. Thus, this study determined the reasons for the incidence of HIV cases.

HIV testing service is a key component of HIV surveillance [22,33,34]. Since 2008, all previously mentioned second- level hospitals established HIV screening laboratories in Suizhou City, and four townships established the AIDS screening laboratories. Standard classification of hospitals in China is based on hospital function, facilities, and hospital's technical quality evaluation index. According to the "standard of hospital grading management," hospitals are classified into three levels (first, second, third) including special tertiary hospital. Each level is divided into three grades (A, B, and C). Second-level hospitals are the regional hospitals, which provide medical and health services across several communities and performed the laboratory screening for this research. In addition, the main functions of second-level hospital are to participate in the direct monitoring of high-risk groups, accept one-level referral treatment, and provide technical guidance in first-level hospital. They also participate in some medical teaching and scientific research.

Five HIV voluntary counseling offices provide counseling and testing for people who need the services. Some Chinese MSM refused to attend the outreach meeting and receive HIV/AIDS-related intervention because of the following reasons [35]: (i) lack of self-protection awareness: MSM always consider they are safe and taking the test or any protective measure is unnecessary; (ii) poor understanding on the test procedures and fear of identity disclosure; and (iii) social discrimination against MSM.

The center has the following aims: First, it collects the personal information of the target groups by chatting and strengthening the communication with the target groups. Through this study, we found that MSM are close to peer psychological support. We gradually make them comfortable and discuss the interventions. Second, the center strengthens the work in promoting condom use, particularly among individuals who are at high risk for HIV through advertising and education [36]. In actual conditions, we provided beneficial strategies to change the behavior of the target population, such as using condom when they have sex with male or female. Third, it takes efforts on keeping confidentiality of personal information and deeply facilitates the work of voluntary counseling and testing to achieve more MSM to undergo the HIV test [37]. Fourth, it enhances the follow-up of positive cases, such as through psychological support, care delivery, and financial support to help the MSM population to return to the community [38]. We suggest the use of mass media to reduce the discrimination of MSM; furthermore, to educate them on HIV transmission regarding their sexual orientation. The willingness of MSM to be tested is essential to take the first step in the prevention and control of HIV epidemic in the region.

Conclusion

Results of our study highlight sexual orientation of the young male Chinese population despite their educational level and official heterosexual status.

Even though, sexual behavior changes occurred after interventions among MSM living in Suizhou City, additionally, high condom use was reported during sexual intercourse with female partner. Further efforts are needed to improve on the field of the government's responses to the epidemic in the midst of MSM.

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Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's website:

Appendix S1 Questionnaire.